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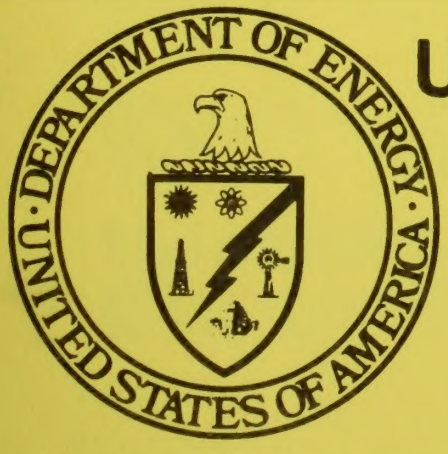
SOLAR/1018-78/11

Monthly Performance Report

STEWART-TEELE-MITCHELL

NOVEMBER 1978



U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

STEWART-TEELE-MITCHELL

NOVEMBER 1978

I. SYSTEM DESCRIPTION

The Stewart-Teele-Mitchell site is a single-family residence in Malta, New York. The home has approximately 1900 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 432 square feet. The array faces south at an angle of 45 degrees to the horizontal. A glycol/water solution is the transfer medium that delivers solar energy from the collector array to a heat exchanger. Water is then used as the transfer medium that delivers solar energy from the heat exchanger to storage, and to the space heating and DHW loads. Solar energy is stored in the basement in a 1000-gallon insulated tank. Preheated city water is stored in a 75-gallon preheat tank and supplied, on demand, to a conventional 40-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, an oil-fired furnace provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has five modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the collector temperature exceeds the storage temperature by 20°F and terminates when a temperature difference of 3°F is reached. Solar energy is transferred through the heat exchanger that transmits energy from the solar collection loop to the storage loop. Collector loop pump P1 and storage loop pump P2 are operating.

Mode 2 - Collector-to-Space Heating: This mode activates when mode 1 conditions are satisfied and there is a demand for space heating. The collected solar energy bypasses storage and flows directly to the solar heating coil in the air-handling system. Mode diversion valve V2 is open.

Mode 3 - Storage-to-Space Heating: This mode activates when there is a demand for space heating, the temperature at the top of the storage tank exceeds 100°F, and solar energy from the collector is not available. Pump P3 is operating.

Mode 4 - Storage-to-DHW Tank: This mode activates when the temperature at the top of the storage tank exceeds the preheat tank water temperature by 10°F. Pump P4 is operating.

Mode 5 - Summer Mode, Collector-to-Vent: This mode activates when the collector array output fluid temperature exceeds 220°F. The collected solar energy is rejected through a fintube heat exchanger located outside the dwelling. Valve V1 directs the collector loop flow through a purge unit.

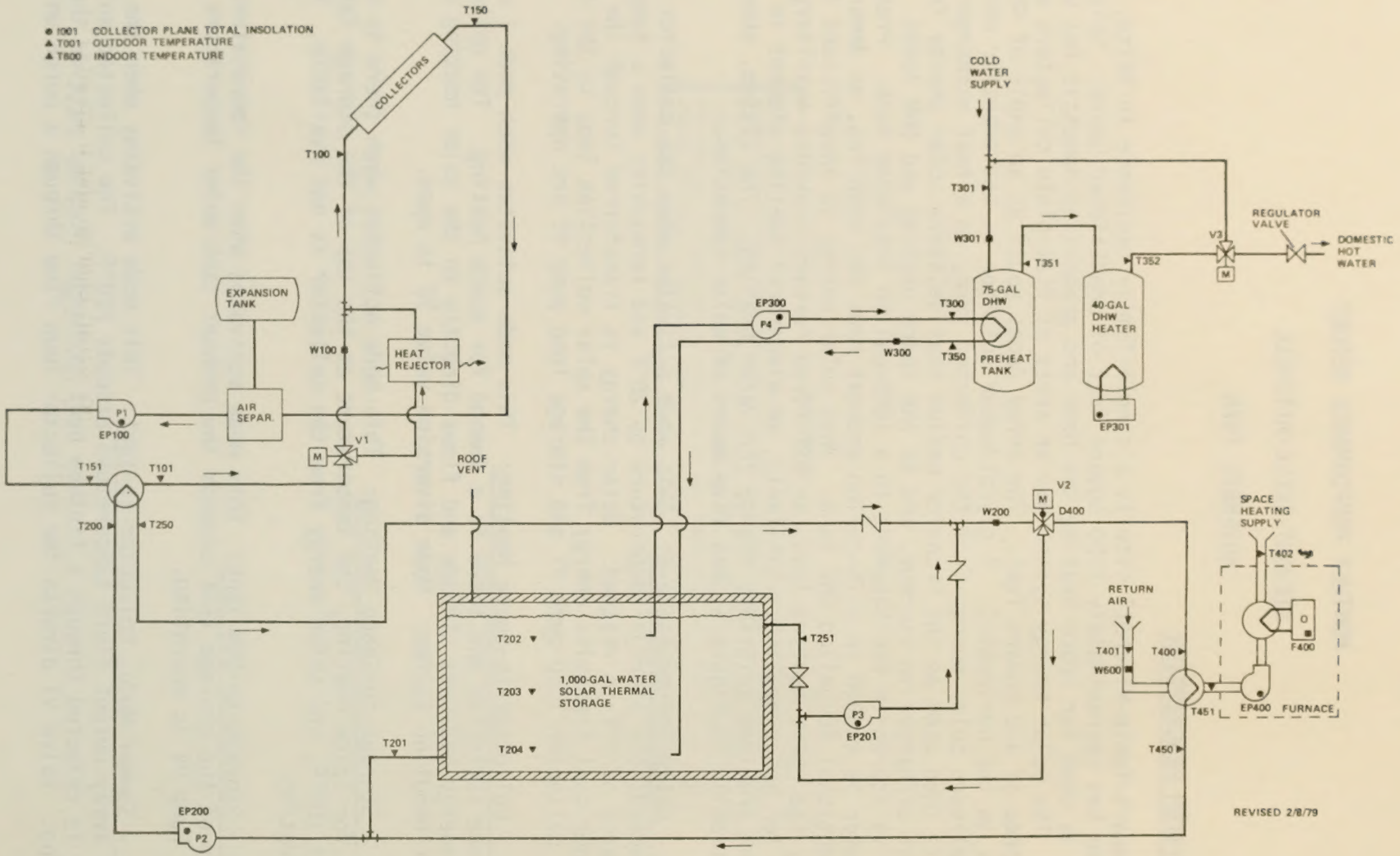

Figure 1. STEWART–TEELE–MITCHELL SOLAR ENERGY SYSTEM SCHEMATIC

II. PERFORMANCE EVALUATION

INTRODUCTION

The solar energy system operated continuously during November except for the first two days of the month. The average daily insolation was well above the long-term November average for the area, but the average daily temperature was below the long-term average. Solar energy satisfied a small portion of the space heating load during the month with the system operating in both modes 2 and 3. There was a small positive change in stored energy for the month. Since the house was unoccupied, the DHW load was insignificant and the DHW subsystem did not operate.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 11.5 million Btu for a daily average of 886 Btu per square foot. This was above the estimated average daily solar radiation for this geographical area during November of 780 Btu per square foot for a south-facing plane with a tilt of 45 degrees to the horizontal. The average ambient temperature during November was 37°F as compared with the long-term average for November of 40°F.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of November was 11.5 million Btu. During the period the collector loop was operating, the total insolation amounted to 6.6 million Btu. The total collected solar energy for the month of November was 1.9 million Btu, resulting in a collector array efficiency of 16 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 1.6 million Btu, while solar energy delivered from the collector array directly to the loads amounted to 0.088 million Btu. Energy loss during transfer from the collector array to storage and loads was 0.18 million Btu. Operational energy required by the collector loop was 0.077 million Btu.

Storage - Solar energy delivered to storage was 1.6 million Btu. There were 0.56 million Btu delivered from storage to the space heating subsystem. Energy loss from storage was 0.96 million Btu. This loss represented 60 percent of the energy delivered to storage. The storage efficiency was 40 percent. This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 110°F.

DHW Load - The DHW subsystem consumed no solar energy and 0.26 million Btu of auxiliary electrical energy to satisfy a hot water load of 0.016 million Btu.

Since pump P4 did not operate during the month, no operational energy was consumed. A daily average of one gallon of DHW was consumed at an average temperature of 126°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.45 million Btu of solar energy and 4.7 million Btu of auxiliary thermal energy (equivalent to 7.8 million Btu of auxiliary fossil fuel energy) to satisfy a space heating load of 5.1 million Btu. The solar fraction of this load was 9 percent. The space heating subsystem consumed a total of 0.90 million Btu of operating energy, resulting in an electrical energy expense of 0.16 million Btu.

OBSERVATIONS

Since this house was unoccupied, the November building temperature averaged only 63°F and hot water usage was insignificant. This resulted in an energy load well below that which would have been expected if the house was occupied.

The demand for space heating during November, however, brought to light a characteristic of the solar energy system which had not been observed previously. During November the system operated concurrently in modes 1 and 2. When the system was collecting energy, the heat transfer fluid flow divided at valve V2 and flowed to both the solar coil in the space heating air loop and to the storage tank. Whether this mode reflects system design or is the result of a leaky valve, it appears to be a desirable system operational feature. The present instrumentation is not entirely adequate to measure performance in this mode. The addition of a flowmeter between valve V2 and the storage tank inlet and the movement of W200 to the furnace side of valve V2 is required to accurately measure the flow in the two loops. Instrumentation deficiencies have been overcome by measuring the solar energy delivered directly from the collector to space heating on the air side of the solar coil, while the energy delivered concurrently to storage has been measured using the flow in the liquid loop. This workaround procedure has the drawback of concealing solar system losses which occur between the output side of the collector loop heat exchanger and storage/load.

The need for additional instrumentation to accommodate the actual operation of the system will be assessed on the basis of system operation during December.

ENERGY SAVINGS

The solar energy system provided a total fossil fuel energy savings of 0.74 million Btu. The space heating subsystem contributed the entire energy savings of 0.74 million Btu.

III. ACTION STATUS

A leak in the collector loop was repaired by the site contractor during the first week in November. Minor problems with the collector loop instrumentation still cause the amount of solar energy collected to be slightly understated. Boeing will address this problem during the next site visit.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: STEWART-TEELE-MITCHELL
REPORT PERIOD: NOVEMBER,1978

SOLAR/1018-78/11

SITE/SYSTEM DESCRIPTION:
THE STEWART-TEELE-MITCHELL SOLAR SYSTEM IS INSTALLED IN A 1900 SQ.FT. SINGLE FAMILY DWELLING LOCATED IN MALTA, NY. SOLAR ENERGY IS USED FOR SPACE HEATING AND HOT WATER PREHEATING. THE COLLECTOR ARRAY HEAT TRANSFER FLUID IS 40% GLYCOL/WATER. THE STORAGE AND SOLAR ENERGY DISTRIBUTION FLUID IS WATER. SOLAR ENERGY CAN BE DELIVERED DIRECTLY TO THE LOAD OR TO STORAGE. AUXILIARY SPACE HEATING IS PROVIDED BY AN OIL-FIRED, FORCED AIR FURNACE.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	11.488	MILLION BTU
	26593	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	1.864	MILLION BTU
	4316	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	37	DEGREES F
AVERAGE BUILDING TEMPERATURE	63	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	0.04	
ECSS OPERATING ENERGY	0.077	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	0.982	MILLION BTU
TOTAL ENERGY CONSUMED	10.940	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL	
LOAD	0.016	5.148	N.A.	5.164	MILLION BTU
SOLAR FRACTION	0	9	N.A.	9	PERCENT
SOLAR ENERGY USED	0.001	0.446	N.A.	0.447	MILLION BTU
OPERATING ENERGY	0.000	0.904	N.A.	0.982	MILLION BTU
AUX. THERMAL ENERGY	0.256	4.702	N.A.	4.958	MILLION BTU
AUX. ELECTRIC FUEL	0.256	N.A.	N.A.	0.256	MILLION BTU
AUX. FOSSIL FUEL	N.A.	7.836	N.A.	7.836	MILLION BTU
ELECTRICAL SAVINGS	0.000	-0.164	N.A.	-0.242	MILLION BTU
FOSSIL SAVINGS	N.A.	0.743	N.A.	0.743	MILLION BTU

SYSTEM PERFORMANCE FACTOR: 0.43

* DENOTES UNAVAILABLE DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18
READ THIS BEFORE TURNING PAGE

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: STEWART-TEELE-MITCHELL
REPORT PERIOD: NOVEMBER,1978

SOLAR/1018-78/11

SITE/SYSTEM DESCRIPTION:
THE STEWART-TEELE-MITCHELL SOLAR SYSTEM IS INSTALLED IN A 1900 SQ.FT. SINGLE FAMILY DWELLING LOCATED IN MALTA, NY. SOLAR ENERGY IS USED FOR SPACE HEATING AND HOT WATER PREHEATING. THE COLLECTOR ARRAY HEAT TRANSFER FLUID IS 40% GLYCOL/WATER. THE STORAGE AND SOLAR ENERGY DISTRIBUTION FLUID IS WATER. SOLAR ENERGY CAN BE DELIVERED DIRECTLY TO THE LOAD OR TO STORAGE. AUXILIARY SPACE HEATING IS PROVIDED BY AN OIL-FIRED, FORCED AIR FURNACE.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	12.120	GIGA JOULES
	301993	KJ/SQ.M.
COLLECTED SOLAR ENERGY	1.967	GIGA JOULES
	49014	KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	3	DEGREES C
AVERAGE BUILDING TEMPERATURE	17	DEGREES C
ECSS SOLAR CONVERSION EFFICIENCY	0.04	
ECSS OPERATING ENERGY	0.082	GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	1.036	GIGA JOULES
TOTAL ENERGY CONSUMED	11.542	GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.017	5.431	N.A.	5.448 GIGA JOULES
SOLAR FRACTION	0	9	N.A.	9 PERCENT
SOLAR ENERGY USED	0.001	0.470	N.A.	0.471 GIGA JOULES
OPERATING ENERGY	0.000	0.954	N.A.	1.036 GIGA JOULES
AUX. THERMAL ENG	0.270	4.960	N.A.	5.231 GIGA JOULES
AUX. ELECTRIC FUEL	0.270	N.A.	N.A.	0.270 GIGA JOULES
AUX. FOSSIL FUEL	N.A.	8.267	N.A.	8.267 GIGA JOULES
ELECTRICAL SAVINGS	0.000	-0.173	N.A.	-0.256 GIGA JOULES
FOSSIL SAVINGS	N.A.	0.784	N.A.	0.784 GIGA JOULES

SYSTEM PERFORMANCE FACTOR: 0.43

* DENOTES UNAVAILABLE DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: STEWART-TEELE-MITCHELL
REPORT PERIOD: NOVEMBER,1978

SOLAR/1018-78/11

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.833	41	0.000	N	0.000	0.000	0.000
2	0.798	45	0.000	O	0.000	0.000	0.000
3	0.757	44	0.000	T	0.002	0.000	0.000
4	0.652	43	0.000		0.008	0.000	0.002
5	0.540	45	0.009	A	0.006	0.000	0.021
6	0.572	50	0.007	P	0.006	0.000	0.029
7	0.068	48	0.000	P	0.000	0.000	0.000
8	0.204	42	0.000	L	0.000	0.000	0.023
9	0.557	40	0.011	I	0.004	0.000	0.032
10	0.600	45	0.009	C	0.005	0.000	0.022
11	0.482	45	0.008	A	0.004	0.000	0.018
12	0.594	35	0.005	B	0.004	0.000	0.011
13	0.062	33	0.000	L	0.000	0.000	0.001
14	0.131	52	0.000	E	0.000	0.000	0.023
15	0.163	43	0.000		0.000	0.000	0.010
16	0.554	36	0.011		0.003	0.000	0.030
17	0.166	33	0.000		0.000	0.000	0.009
18	0.098	50	0.000		0.000	0.000	0.019
19	0.244	42	0.059		0.001	0.000	0.124
20	0.267	32	0.000		0.002	0.000	0.000
21	0.116	22	0.000		0.000	0.000	0.000
22	0.637	21	0.049		0.006	0.000	0.065
23	0.045	26	0.071		0.000	0.000	0.043
24	0.062	36	0.050		0.000	0.000	0.022
25	0.485	30	0.071		0.004	0.000	0.099
26	0.857	18	0.157		0.007	0.000	0.149
27	0.055	16	0.024		0.000	0.000	0.277
28	0.048	28	0.000		0.000	0.000	0.000
29	0.571	34	0.069		0.005	0.000	0.101
30	0.254	35	0.030		0.003	0.000	0.072
SUM	11.488	-	0.649	N.A.	0.077	0.000	-
AVG	0.382	37	0.021	N.A.	0.002	0.000	0.039
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: STEWART-TEELE-MITCHELL
REPORT PERIOD: NOVEMBER,1978

SOLAR/1018-78/11

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.833	0.000	0.000	50	0.000
2	0.798	0.000	0.000	54	0.000
3	0.757	0.092	0.041	55	0.054
4	0.652	0.592	0.125	54	0.192
5	0.540	0.429	0.081	56	0.150
6	0.572	0.474	0.093	60	0.163
7	0.068	0.000	0.000	50	0.000
8	0.204	0.023	0.012	47	0.060
9	0.557	0.465	0.094	48	0.169
10	0.600	0.530	0.215	54	0.359
11	0.482	0.371	0.112	54	0.234
12	0.594	0.503	0.111	38	0.188
13	0.062	0.000	0.000	34	0.000
14	0.131	0.021	0.024	*	0.188
15	0.163	0.007	0.000	44	0.000
16	0.554	0.481	0.127	44	0.229
17	0.166	0.014	0.019	40	0.120
18	0.098	0.004	0.000	51	0.010
19	0.244	0.085	0.025	48	0.104
20	0.267	0.180	0.021	38	0.080
21	0.116	0.000	0.000	24	0.000
22	0.637	0.547	0.185	28	0.292
23	0.045	0.000	0.000	29	0.000
24	0.062	0.000	0.000	38	0.000
25	0.485	0.370	0.113	*	0.233
26	0.857	0.769	0.247	25	0.289
27	0.055	0.000	0.000	16	0.000
28	0.048	0.000	0.000	32	0.000
29	0.571	0.459	0.159	38	0.280
30	0.254	0.156	0.050	42	0.200
SUM	11.488	6.580	1.864	-	-
AVG	0.382	0.219	0.062	43	0.162
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE:STEWART-TEELE-MITCHELL
REPORT PERIOD:NOVEMBER,1978

SOLAR/1018-78/11

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.000	0.000	-0.007	86	1.000
2	0.000	0.000	-0.009	85	1.000
3	0.047	0.000	0.039	86	0.829
4	0.190	0.000	0.182	103	0.960
5	0.093	0.000	0.036	117	0.390
6	0.092	0.000	0.040	122	0.435
7	0.000	0.000	-0.040	122	1.000
8	0.000	0.000	-0.034	117	1.000
9	0.065	0.000	0.032	116	0.498
10	0.138	0.000	0.102	126	0.741
11	0.070	0.000	0.019	135	0.272
12	0.119	0.000	0.019	137	0.163
13	0.000	0.000	-0.052	135	1.000
14	0.000	0.000	-0.043	129	1.000
15	0.000	0.000	-0.041	123	1.000
16	0.092	0.000	0.060	124	0.649
17	0.000	0.000	-0.042	126	1.000
18	0.000	0.000	-0.039	120	1.000
19	0.008	0.056	-0.174	109	-13.884
20	0.000	0.000	-0.010	93	1.000
21	0.000	0.000	-0.010	92	1.000
22	0.181	0.044	0.094	99	0.765
23	0.000	0.071	-0.024	102	1.000
24	0.000	0.050	-0.029	98	1.000
25	0.105	0.070	0.034	101	1.000
26	0.216	0.150	0.006	107	0.725
27	0.000	0.024	-0.039	99	1.000
28	0.000	0.000	-0.020	95	1.000
29	0.152	0.063	0.053	99	0.766
30	0.026	0.030	-0.020	99	0.391
SUM	1.600	0.561	0.081	-	-
AVG	0.053	0.018	0.002	110	0.402
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE:STEWART-TEELE-MITCHELL
REPORT PERIOD:NOVEMBER,1978

SOLAR/1018-78/11

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER.	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.001	0	0.000	0.000	0.013	0.013	N	0.000	N	63	142	2
2	0.000	0	0.000	0.000	0.010	0.010	O	0.000	O	58	144	1
3	0.003	0	0.000	0.000	0.011	0.011	T	0.000	T	63	140	4
4	0.000	0	0.000	0.000	0.009	0.009		0.000		55	140	0
5	0.000	0	0.000	0.000	0.011	0.011	A	0.000	A	55	140	0
6	0.000	0	0.000	0.000	0.011	0.011	P	0.000	P	55	140	0
7	0.000	0	0.000	0.000	0.012	0.012	P	0.000	P	55	140	0
8	0.000	0	0.000	0.000	0.009	0.009	L	0.000	L	58	142	1
9	0.000	0	0.000	0.000	0.012	0.012	I	0.000	I	60	144	0
10	0.000	0	0.000	0.000	0.010	0.010	C	0.000	C	60	144	0
11	0.000	0	0.000	0.000	0.011	0.011	A	0.000	A	60	142	1
12	0.000	0	0.000	0.000	0.009	0.009	B	0.000	B	61	140	0
13	0.000	0	0.000	0.000	0.010	0.010	L	0.000	L	61	140	0
14	0.000	0	0.000	0.000	0.008	0.008	E	0.000	E	61	140	0
15	0.000	0	0.000	0.000	0.011	0.011		0.000		61	140	0
16	0.000	0	0.000	0.000	0.008	0.008		0.000		61	140	0
17	0.003	0	0.000	0.000	0.014	0.014		0.000		60	141	4
18	0.000	0	0.000	0.000	0.010	0.010		0.000		52	143	0
19	0.000	0	0.000	0.000	0.011	0.011		0.000		58	143	1
20	0.000	0	0.000	0.000	0.011	0.011		0.000		71	142	1
21	0.001	0	0.000	0.000	0.009	0.009		0.000		66	142	3
22	0.000	0	0.000	0.000	0.000	0.000		0.000		58	137	1
23	0.000	0	0.000	0.000	0.000	0.000		0.000		69	117	0
24	0.001	0	0.000	0.000	0.000	0.000		0.000		63	102	5
25	0.002	0	0.001	0.000	0.000	0.000		0.000		54	85	8
26	0.000	0	0.000	0.000	0.000	0.000		0.000		54	81	1
27	0.000	0	0.000	0.000	0.000	0.000		0.000		59	73	6
28	0.000	0	0.000	0.000	0.000	0.000		0.000		52	70	0
29	0.000	0	0.000	0.000	0.000	0.000		0.000		57	69	1
30	0.000	0	0.000	0.000	0.027	0.027		0.000		70	67	1
SUM	0.016	-	0.001	0.000	0.256	0.256	N.A.	0.000	N.A.	-	-	39
AVG	0.000	0	0.000	0.000	0.008	0.008	N.A.	0.000	N.A.	60	126	1
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: STEWART-TEELE-MITCHELL
REPORT PERIOD: NOVEMBER,1978

SOLAR/1018-78/11

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.105	0	0.000	0.006	0.105	N	0.175	0.000	0.000	67	41
2	0.163	0	0.000	0.011	0.163	O	0.272	0.000	0.000	66	45
3	0.127	0	0.000	0.008	0.127	T	0.213	0.000	0.000	67	44
4	0.142	1	0.001	0.013	0.141		0.235	-0.001	0.002	66	43
5	0.026	41	0.011	0.029	0.015	A	0.026	-0.007	0.018	63	45
6	0.016	100	0.016	0.023	0.000	P	0.000	-0.005	0.027	64	50
7	0.000	100	0.000	0.033	0.000	P	0.000	-0.008	0.000	63	48
8	0.020	23	0.004	0.046	0.015	L	0.026	-0.010	0.007	61	42
9	0.076	23	0.017	0.037	0.058	I	0.097	-0.008	0.029	62	40
10	0.023	56	0.013	0.028	0.010	C	0.017	-0.006	0.022	63	45
11	0.017	49	0.008	0.023	0.008	A	0.014	-0.005	0.014	63	45
12	0.065	10	0.006	0.035	0.058	B	0.097	-0.008	0.011	62	35
13	0.215	0	0.000	0.050	0.215	L	0.359	-0.011	0.000	61	33
14	0.070	4	0.002	0.043	0.067	E	0.112	-0.009	0.004	62	52
15	0.050	3	0.001	0.048	0.048		0.081	-0.011	0.002	61	43
16	0.089	18	0.016	0.040	0.073		0.121	-0.009	0.027	63	36
17	0.172	1	0.001	0.049	0.170		0.284	-0.011	0.002	61	33
18	0.020	9	0.001	0.040	0.019		0.031	-0.009	0.003	62	50
19	0.204	15	0.030	0.043	0.174		0.290	-0.008	0.050	62	42
20	0.360	0	0.000	0.026	0.360		0.600	0.000	0.000	68	32
21	0.465	0	0.000	0.028	0.465		0.776	0.000	0.000	68	22
22	0.277	15	0.041	0.027	0.236		0.393	-0.003	0.069	66	21
23	0.226	1	0.001	0.051	0.224		0.373	-0.012	0.003	60	26
24	0.309	0	0.001	0.040	0.308		0.513	-0.007	0.002	61	36
25	0.206	23	0.046	0.014	0.159		0.265	-0.001	0.078	65	30
26	0.322	40	0.127	0.021	0.194		0.324	-0.003	0.212	63	18
27	0.504	3	0.015	0.028	0.488		0.814	0.000	0.025	63	16
28	0.361	0	0.000	0.021	0.361		0.603	0.000	0.000	63	28
29	0.206	28	0.057	0.013	0.148		0.247	-0.001	0.096	61	34
30	0.296	6	0.018	0.017	0.278		0.463	0.000	0.030	60	35
SUM	5.148	-	0.446	0.904	4.702	N.A.	7.836	-0.164	0.743	-	-
AVG	0.171	9	0.014	0.030	0.156	N.A.	0.261	-0.005	0.024	63	37
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

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SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE:STEWART-TEELE-MITCHELL
REPORT PERIOD:NOVEMBER,1978

SOLAR/1018-78/11

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	1930	N	41	50	N	N	N
2	1849	O	45	54	O	O	O
3	1753	T	44	55	T	T	T
4	1511		43	54			
5	1252	A	45	56	A	A	A
6	1326	P	50	60	P	P	P
7	158	P	48	50	P	P	P
8	473	L	42	47	L	L	L
9	1290	I	40	48	I	I	I
10	1389	C	45	54	C	C	C
11	1117	A	45	54	A	A	A
12	1376	B	35	38	B	B	B
13	144	L	33	34	L	L	L
14	304	E	52	*	E	E	E
15	379		43	44			
16	1283		36	44			
17	385		33	40			
18	229		50	51			
19	566		42	48			
20	619		32	38			
21	270		22	24			
22	1476		21	28			
23	106		26	29			
24	145		36	38			
25	1124		30	*			
26	1985		18	25			
27	129		16	16			
28	113		28	32			
29	1324		34	38			
30	589		35	42			
SUM	26593	N.A.	-	-	-	-	-
AVG	886	N.A.	37	43	N.A.	N.A.	N.A.
NBS ID	Q001		N113			N115	N114

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